

(94)

**A GIS-based Binary Logistic Regression Model for the Inundation Analysis; A Case Study on Elapatha DS Division, Ratnapura District, Sri Lanka**

**Ekanayaka H.D.M.<sup>1\*</sup>, Jayasinghe G.Y.<sup>1</sup>, Priyankara P.<sup>2</sup>**

<sup>1</sup>*Department of Agriculture Engineering, University of Ruhuna, Matara, Sri Lanka*

<sup>2</sup>*Computer Unit, Faculty of Agriculture, University of Ruhuna, Matara, Sri Lanka*

*\*hasinidilthara@gmail.com*

**Abstract**

Flood susceptibility analysis (FSA) is a prerequisite for adopting flood mitigation and adaptation techniques. A number of technologies and models have emerged through time, and this study focuses on the Binary Logistic Regression Model (BLRM) to investigate flood vulnerability of Elapatha Divisional secretariat (DS), Ratnapura District, Sri Lanka where has high impact from inundation. Rainfall, land use and land cover (LULC), elevation, slope, slope aspect, distance to the river, topographic wetness index (TWI), and stream power index (SPI) were the factors used in the model construction. These components were investigated in terms of their contribution to flood susceptibility using all location data and field plotting of responsible parameters in the study area using Geographic Information System (GIS) software, and all extracted data points were 96489, of which 50% were used for BLRM development using SPSS statistical software and remaining 50% for model validation. The coefficient of rainfall parameters, log value of elevation in meters, the tan value of slope in degrees, radiant value of aspect in degrees, (distance from the river)0.1, the ratio between SPI and TWI (SPI/TWI) and LULC band values of built-up area, water bodies and vegetations were 0.023, -2.254, -1.018, -0.005, -0.164, -0.003, 2.707, -.067 and -0.004 respectively. The accuracy was validated using Mean standard error (MSE) and area under curve (AUC) analysis, with values of 0.031 and 0.724 respectively. The Built-up area, elevation, and slope had the most impact on the inundation Elapatha DS division, and model performance represents 72.4% accuracy. Therefore, mitigation of inundation problems can be achieved through proper landscaping in the area.

**Keywords:** Binary logistic Regression, Flood susceptibility Analysis, GIS software, Spatial analysis